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ABSTRACT

Recommended are practices for reducing energy consumed in the process of transporting school pupils. Among the areas in which energy conservation measures may be instituted are preventive bus maintenance, field trip coordination, bus driving practices, modified scheduling policies, and training of bus drivers. (WB)

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ENERGY CONSERVATION GUIDELINES 4

Energy Conservation in School Transportation Systems

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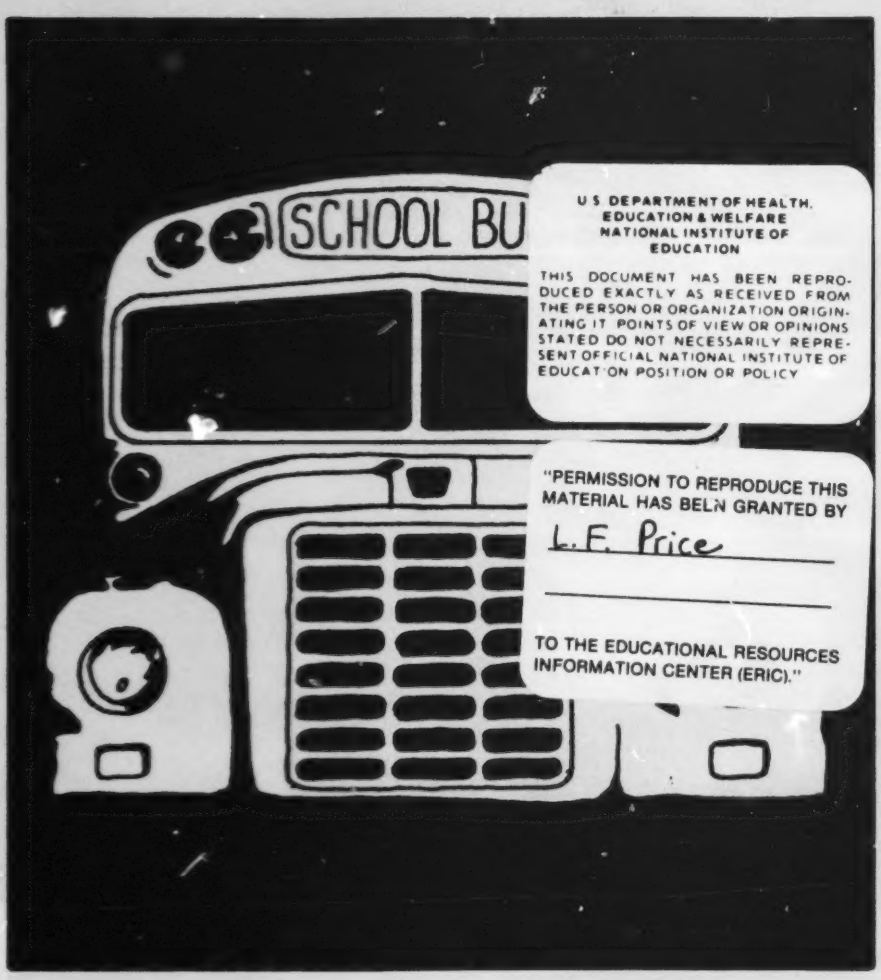

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ENERGY CONSERVATION IN SCHOOL TRANSPORTATION SYSTEMS

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Commissioner of Education

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FOREWORD

Energy Conservation in the area of pupil transportation must be a major objective of New Jersey's educational community. Every year, New Jersey school buses travel about 50 million miles and use more than 6 million gallons of fuel. More than 60 percent of school children in grades kindergarten through 12 are transported on one of New Jersey's 12,000 school vehicles.

The scarcity of fossil fuel resources coupled with a rapidly escalating price has made conservation a necessity. New Jersey's pupil transporters have responded to the energy crunch.

Included here are some of the basic guidelines for sound fuel reductions in school transportation. From these guidelines, a comprehensive program can be developed for use by individual school districts.

Many of the guidelines mentioned here have already been used by members of New Jersey's school transportation community. The guidelines are not revolutionary but rather common sense ideas that can save fuel. We hope this booklet spurs new ideas. We must develop a further commitment to run our school transportation systems as efficiently as possible.

John Giesguth, Director
Pupil Transportation

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ENERGY SAVING PRACTICES

1. Have one person in charge of all energy for transportation. Designate this person as Energy Coordinator for the school district. The Energy Coordinator must
    a. be in touch with local, state and federal energy offices (The State Energy Commission telephone number is 201-648-2076);
    b. keep all forms such as Federal Energy Agency forms on hand and know where, how and when to file them and follow up on them by making sure appropriate action is taken; and
    c. keep the various departments informed of the energy situation at all times, i.e., cut back in heating fuels, bus fuels, etc., or rationing.

2. Conduct an Energy Audit—begin at all places where fuel is used.
    a. The audit should be a month-by-month use for three years with estimates for the current year. Included should be prices, suppliers, bulk storage data, delivery dates and practices.
    b. Information should be accurate and specific, not general.

3. Analyze fuel supply availability and current needs. Which months require the most gasoline or diesel? Which months require the least gasoline or diesel fuel?

4. Set up action plans. (e.g. train and motivate people to save fuel)

5. Set up contingencies for time when fuel is in short supply.

6. Monitor programs as devised to see if they are being effectively carried out.

Remember, the school that systematically identifies and evaluates its needs and supplies, highs and lows, can tailor programs more effectively in advance—rather than be caught short.

GENERAL CONSIDERATIONS

1. The general public is extremely well informed on the need for conservation and expects the schools to be leaders in this area. The unprecedented rise in the cost of fuel makes conservation a must. We must conserve as much as possible in order to prevent cuts in school programs.

2. Community support for educational programs is increased by a school's community services, adult education and recreation programs.

3. There should not be major operational differences between school districts within the city or local areas. Each school district should communicate with surrounding school leaders and share program ideas.

A SCHOOL TRANSPORTATION ENERGY CONSERVATION PROGRAM

Preventive Maintenance

1. Tune and maintain engines, plugs, points and timing. Maintain and clean pollution controls.

2. Change oil, PCV, air and gas filters regularly.

3. Use an oil suitable for driving conditions. Extra money spent on high mileage lubricants can save much more money in improved fuel efficiency.

4. Ensure that tires are inflated properly. Using radial tires can improve fuel efficiency.

5. Keep gas tanks full to avoid excessive evaporation.

6. Where feasible, reduce engine idle speed.

7. If a bus is not obtaining desired fuel economy, find out why.

8. Resolve maintenance problems immediately.

9. Use tire tread, wear patterns, and depth as a guide to alignment needs.

10. Keep gasoline tanks locked, with one person in charge of fueling of buses and other school vehicles.

11. Look inside the exhaust pipe for black soot; it is an indicator of engine inefficiency.

12. At least once a year, perform a major inspection; cylinder compression, valve clearance, fuel pump, vacuum pressure, etc.

13. Keep accurate bus records for maintenance and fuel consumption, oil changes, lubrication, etc.

14. Where practical, order new buses with lower rear end ratios.

15. Switching to solid state ignitions can be a real attempt at saving fuel.

Drivers' Role

1. Observe speed limit. Don't speed.
2. Avoid full throttle operation.
3. Do not warm up busses to let heaters work. Allow heater to warm during trip from garage to first stop. Drive slowly during warm-up period.
4. Avoid courtesy stops—stop only at designated school bus stops.
5. Shut off the engine if the vehicle is going to be stopped for more than one minute.
6. Watch traffic far ahead so you can plan traffic moves early; use the brakes sparingly.
7. Never ride the brake or clutch.
8. When starting on a hill use the parking brake to prevent rolling backward.
9. Don't "rev up" the engine before turning off the ignition.
10. When approaching a hill, build up speed gradually, but early, and maintain it until the vehicle is near the crest—reduce speed and go down hill in the same gear you climbed; maintain control of vehicle.
11. Run through the low gears gently, but quickly, into the higher gears, which are the most efficient for fuel economy.

Supervisors' Role

1. Retain experienced drivers as long as possible.
2. Train new drivers; this should be done on buses to save fuel.
3. Hold joint workshops with maintenance and driver personnel to improve operation.
4. Use an incentive system for reducing vehicle fuel consumption.
5. Select the correct vehicle for each route.
6. Increase frequency of driver inservice programs.
7. If bus drivers have split shifts, determine if their last route ends near their homes. If they do, have them take the bus home during the mid-day period. This will eliminate the extra driving that results from a driver bringing the bus back to the terminal, driving his car home, driving back to the terminal, etc. This must be done in accordance with school board policy.

School Policies

1. Fill buses to legal capacity.
2. Make routing as efficient as possible.
3. Stagger school hours to the extent that you are able to utilize buses to maximum load levels—not necessarily grade levels.
4. Utilize computerized routing facilities, if available. Eliminate overlapping routes.

School Bus Operation: General

1. Have older students walk to central pick-up points.
2. Lengthen distances between pick-up points.
3. Avoid courtesy stops.
4. Plan stops on level instead of on inclines.
5. Consolidate loads.
6. Plan routes to make only right-hand turns to save on idling time where safety in routing permits.
7. Use intercoms on buses to reduce stops for controlling discipline.
8. Reduce weight by removing luggage racks, extra tire, chains, etc. (during warm weather)
9. Install 2-way radios to direct operation or redirection of buses to avoid unnecessary use.
10. Monitor use of vehicles. Install trip recorders to record driver and vehicle operation. Use this information to reduce use of gas and oil.
11. Use modern analyzing equipment to ensure fuel and oil economy.
12. Use the smallest practical vehicle for long-distance, light-load runs.
13. Schedule bus routes to avoid driving up hills, where possible; stay on main roads only.
14. Hold joint workshops with maintenance and bus driver personnel to improve operation of vehicles.
15. Maintain emission controls, i.e. catalytic converters, for peak efficiency.

School Bus Operation for School Boards and Administrators

1. Coordinate school calendars and start and dismissal times between elementary and secondary schools for each school system.

2. Eliminate staggered dismissal times in the same buildings if it will aid efficient transportation.

3. Increase requirements for distances children must walk to school and to bus stops (possibly controversial).

4. Overlap elementary and secondary grades and routes. Minimize staggered school schedules.

5. Eliminate trips designed for the convenience of students between school buildings.

6. Encourage pupils to ride school buses in lieu of their own motor vehicles. If feasible, make this school board policy.

7. Limit student parking, encourage high school pupils to ride school buses, form car pools, etc.

8. Minimize buses for detention students.

9. Explore the satellite concept where classrooms are located away from a central campus. Rent unused houses, churches, and other buildings.

10. Develop innovations and creative programs to encourage students and staff to walk to school or ride bikes. Furnish adequate bike racks. Provide adequate safety for bikes from theft and vandalism.

School Bus Operation: Field and Activity Trips

1. Reduce or eliminate all but the most necessary field trips and athletic trips.

2. Combine field and athletic trips for more than one school.

3. Have districts share buses when holding athletic events.

4. Establish minimum and maximum distances for field trips and athletic trips.

5. Limit field trips to full bus loads only. (Perhaps picking up from several schools en route to game)

6. Combine athletic schedules so several games can be played at the same time.

7. Encourage parents to use car-pools when transporting their children to a common activity. Provide professional help if additional insurance coverage is needed by parents. Arrange for low cost premiums. Consider having the district assume some of the insurance costs.

8. Contract with parents to provide transportation.

9. Use charter and public transportation and their loading and unloading stops, where feasible, to drop off rather than return to school or homes.

10. Use shuttle buses for students to and from athletic contests.

11. Review and evaluate all security measures in the district. Make changes to take care of any increased problems resulting from the energy crisis.

12. Work to change legislation which caused some buses to have capacity reduced.

AREAS OF FUTURE DEVELOPMENT

1. The use of diesel engines in school buses.

2. Bulk purchasing on a county level.

3. County coordinated transportation system:
   a. Special education transportation
   b. Parochial school transportation
   c. For all students
   d. To purchase fuel and parts

4. Keeping regular and updated bus maintenance records.

SUMMARY

Many factors are involved in increasing fuel economy. Choose engines with efficiency and size in mind; select the smallest and most efficient engine for the job. Then, maintain the engine for peak efficiency. Any realistic fuel savings effort must include a preventive maintenance program.

Where you drive, when you drive and how you drive all have tremendous influences on fuel economy. The only sensible way to save fuel is to combine proper driving procedures with proper maintenance. A commitment must be made by all members of the transportation team to effect fuel savings. Fuel consciousness must become a part of the daily routine.

School districts must strive to be as efficient as possible in all areas relating to transportation. This can be accomplished by encouraging school personnel to car-pool, and by encouraging students to ride buses rather than private cars.

Schools have an obligation to be as energy efficient as possible. We must conserve energy. We must do it now!

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